

## Enhanced Single Mode Optical Fibre (ESMF)

Product Type: G.652.D

Coating Type: ColorLock™ and Natural

Draka Comteq Enhanced Single Mode Fibre (ESMF) provides improved performance across the entire 1260 nm to 1625 nm wavelength spectrum. It has a low dispersion in the 1310 nm window and low attenuation in the 1383 nm water-peak region to allow use of the extended band (1360 nm to 1460 nm). With its wide operating spectrum, ESMF expands the future growth capability of the fibre and allows flexible configuration of voice, data, and video services within the fibre. It can be used in all cable constructions, including loose tube, tight buffered, ribbon, and central tube designs.

The tighter geometrical, attenuation and PMD specifications of ESMF enables superior performance in long haul, metropolitan, access and premises applications in telecommunications, CATV and utility networks. ESMF is completely interchangeable with standard single mode fibre.

Draka Comteq's Advanced Plasma and Vapor Deposition (APVD™) manufacturing process ensures the highest quality and purity of fibres. Proprietary ColorLock™ coating process further enhances the performance, durability and reliability of the fibre, even in the harshest environments.

The fibre complies with or exceeds the ITU-T Recommendation G.652.D, the IEC Int. Standard 60793-2-50 type B.1.3 Optical Fibre Specification, Telcordia GR-20-CORE, ANSI/ICEA S-87-640 and RUS 7CFR 1755.900.

Features	Benefits
• Low 1383 nm (water-peak) attenuation	• Provides expanded fibre capacity and cost savings through use of cheaper lasers in the entire 1260 to 1625 nm range, multiplexing filters and higher number of channels
• Low hydrogen sensitivity	• Low attenuation in the 1383 nm region even as fibre ages, for improved performance and long life
• Lower PMD of 0.06 ps/√km link design value	• Extends the PMD distance performance, reducing regeneration costs
• Low 1460 nm attenuation (< 0.25 dB/km)	• Easy design of low cost laser and filter based systems over a wide wavelength range
• Proprietary APVD™ manufacturing process	• Ensure efficient Raman pumping for C-band amplification
• Revolutionary ColorLock coating process	• Superior geometry, uniformity and purity
	• Increased reliability, durability, and superior aging performance, resulting in lower maintenance and replacement costs
	• Makes colour a component of the coating, thus enhancing fibre identification and coloured fibre reliability
	• Consistent, vibrant colour for easy-of-use and flexibility

Draka Comteq | Optical Fibre

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Optical Specifications (Uncabled fibre)			
Attenuation		Max. Value (dB/km)	
Attenuation at 1310 nm		0.33 – 0.35	
Attenuation at 1383 nm*		0.32 – 0.35	
Attenuation at 1460 nm		0.25	
Attenuation at 1550 nm		0.19 – 0.21	
Attenuation at 1625 nm		0.20 – 0.23	
* Including H2-aging according to IEC 60793-2-50, type B.1.3 Other values available on request.			
Attenuation vs. Wavelength			
Maximum attenuation change over the window from reference			
Wavelength range (nm)	Reference $\lambda$ (nm)	Difference (dB/km)	
1285 - 1330	1310	≤ 0.03	
1525 - 1575	1550	≤ 0.02	
1460 - 1625	1550	≤ 0.04	
Point discontinuities			
No point discontinuity greater than 0.05 dB at 1310 nm or 1550 nm.			
Attenuation with Bending			
Number of Turns	Mandrel Diameter (mm)	Wavelength (nm)	Induced Attenuation (dB)
100	50	1310	≤ 0.05
100	50	1550	≤ 0.05
100	60	1625	≤ 0.05
Cutoff Wavelength			
Cable Cutoff wavelength ( $\lambda_{ccf}$ )			≤ 1260 nm
Mode Field Diameter			
Wavelength (nm)	MFD ( $\mu\text{m}$ )		
1310	9.2 ± 0.4		
1550	10.3 ± 0.5		
Chromatic Dispersion			
Wavelength (nm)	Chromatic Dispersion (ps/[nm.km])		
1285 – 1330	≤  3		
1550	≤ 18.0		
1625	≤ 22.0		
Zero Dispersion Wavelength ( $\lambda_0$ ):		1300 - 1322 nm	
Slope ( $S_0$ ) at $\lambda_0$ :		≤ 0.090 ps/(nm <sup>2</sup> .km)	
Polarization Mode Dispersion (PMD)			
			( $\sqrt{\text{km}}$ )
PMD Link Design Value**			≤ 0.06
Max. Individual Fibre			≤ 0.1
** According to IEC 60794 -3, Ed 3 (Q=0.01%)			

Geometrical Specifications	
Glass Geometry	
Cladding Diameter	125.0 ± 0.7 $\mu\text{m}$
Core/Cladding Concentricity	≤ 0.5 $\mu\text{m}$
Cladding Non-Circularity	≤ 0.7 %
Fibre Curl (radius)	≥ 4 m
Coating Geometry	
Coating Diameter	242 ± 7 $\mu\text{m}$
Coating / Cladding Concentricity	≤ 12 $\mu\text{m}$
Coating Non-Circularity	≤ 5 %
Lengths	Standards lengths up to 50.4 km

Mechanical Specifications	
Proof test	
The entire length is subjected to a tensile proof stress > 0.7 GPa (100 kpsi); 1% strain equivalent.	
Tensile Strength	
Dynamic tensile strength (0.5 meter gauge length): Aged*** and unaged median > 3.8 GPa (550 kpsi) *** Aging at 85°C, 85% RH, 30 days	
Dynamic and Static Fatigue	
Dynamic fatigue, unaged and aged***	$n_d > 20$
Static fatigue, aged***	$n_s > 23$
Coating Performance	
Coating strip force unaged and aged****:	
- Average strip force: 1 N to 3 N	
- Peak strip force: 1.3 N to 8.9 N (0.2 lbf to 2.0 lbf)	
**** Aging:	
<ul style="list-style-type: none"> <li>0°C and 45°C</li> <li>30 days at 85°C and 85% RH</li> <li>14 days water immersion at 23°C</li> <li>Wasp spray exposure (Telcordia)</li> </ul>	

Environmental Specifications		
Environmental Test	Test Conditions	Induced Attenuation at 1310, 1550 nm (dB/km)
Temperature cycling	-60°C to 85°C	≤ 0.05
Temperature-Humidity cycling	-10°C to 85°C, 4-98% RH	≤ 0.05
Water Immersion	14 days; 23°C	≤ 0.05
Dry Heat	30 days; 85°C	≤ 0.05
Damp Heat	30 days; 85°C; 85% RH	≤ 0.05

Typical Characterisation Values	
Nominal Zero Dispersion Slope	0.085 ps/(nm <sup>2</sup> .km)
Effective group index @ 1310 nm	1.467
Effective group index @ 1550 nm	1.468
Effective group index @ 1625 nm	1.468
Rayleigh Backscatter Coefficient for 1 ns pulse width:	
@ 1310 nm	-79.4 dB
@ 1550 nm	-81.7 dB
@ 1625 nm	-82.5 dB
Median Dynamic Tensile Strength (Aged at 85°C, 85% RH, 30 days; 0.5 m gauge length)	750 kpsi / 5.3 GPa